

We claim:

1. A method for selective payload cancellation in an optical communication system (OCS), including an Intensity Modulator for selectively controlling the intensity of payload of the OCS, the method comprising steps of:
 - 5 extracting and processing signal from an input of the Intensity Modulator;
 - extracting and processing signal from an output of the Intensity Modulator;
 - 10 estimating amplitude and phase of a frequency band in a payload to be cancelled by a Digital Signal Processing and Control Unit (DSPCU);
 - producing output signals of said DSPCU using the extracted and processed signals from the input and the output of the Intensity Modulator; and
 - 15 generating a cancellation signal using the output signals produced by the DSPCU and the extracted and processed signal from the input of the Intensity Modulator, and canceling the frequency band in the payload to be cancelled.
- 20 2. A method as claimed in claim 1, wherein the step of extracting and processing signal from the input of the Intensity Modulator comprises the steps of:

tapping input payload signal at the input of the Intensity Modulator;
converting the tapped input payload signal into input electrical signal
using an optical to electrical converter; and
processing said input electrical signal.

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3. A method as claimed in claim 1, wherein the step of extracting and
processing signal from the output of the Intensity Modulator comprises
the steps of:

tapping output payload signal at the output of the Intensity Modulator;

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converting the tapped output payload signal into output electrical signal

using an optical to electrical converter; and

processing said output electrical signal.

4. A method as claimed in claim 1, wherein the step of estimating
amplitude and phase of the frequency band in the payload to be cancelled
comprises the steps of:

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extracting the amplitudes and phases of spectral components of the

frequency band in the payload to be cancelled using a DFT (Digital

Fourier Transform) of the processed output electrical signal using an

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Amplitude and Phase Estimator within the DSPCU; and

computing an effective amplitude and phase for each spectral

component of the frequency band in the payload to be cancelled by the

DSPCU.

5. A method as claimed in claim 1, wherein the step of producing the output signals of the DSPCU comprises the steps of:

generating a variable gain control signal by an Adaptive Variable Gain

5 Control Unit in the DSPCU as a first output signal of the DSPCU;

generating a variable phase delay control signal by an Adaptive Phase

Control Unit in the DSPCU as a second output signal of the DSPCU;

and

generating a third output signal by the DSPCU for processing the

10 output electrical signal.

6. A method as claimed in claim 2, wherein the step of processing the input electrical signal comprising the steps of:

amplifying the input electrical signal in accordance with the first output

15 signal produced by the DSPCU; and

filtering the amplified signal for extracting the frequency band in the

payload to be cancelled by applying a high order linear band-pass

filter.

20 7. A method as claimed in claim 1, wherein the step of generating the cancellation signal and canceling the frequency band in the payload to be cancelled comprises the steps of:

phase matching the input payload signal at the Intensity Modulator and the cancellation signal applied to the Intensity Modulator by a Variable Phase Delay unit, using the second output signal produced by the DSPCU and the extracted and processed input signal; and
5 applying the cancellation signal through a driver to the Intensity Modulator for selectively controlling the intensity of the payload and removing the frequency band to be canceled in the payload.

8. A method as claimed in claim 3, wherein the step of processing the
10 output electrical signal comprises the steps of:

amplifying the tapped output payload signal in accordance with the third output signal produced by the DSPCU;

filtering the amplified signal for extracting the frequency band in the payload to be cancelled by applying the high order linear band-pass

15 filter; and

converting the filtered output from analog to digital by an Analog to Digital Converter (ADC) for the digital processing performed by the DSPCU.

20 9. A system for selective payload cancellation in an optical communication system (OCS), including an Intensity Modulator for selectively controlling the intensity of payload of the OCS, the system comprising:

means for extracting and processing signal from an input of the
Intensity Modulator;

means for extracting and processing signal from an output of the
Intensity Modulator;

5 a Digital Signal Processing and Control Unit (DSPCU) for estimating
amplitude and phase of a frequency band in a payload to be cancelled
and for producing output signals using the extracted and processed
signals from the input and the output of the Intensity Modulator; and
means for generating a cancellation signal using the output signals
10 produced by the DSPCU and the extracted and processed signal from
the input of the Intensity Modulator.

10. A system as claimed in claim 9, wherein the means for extracting
and processing signals at the input of the Intensity Modulator, comprises:

15 an input optical tap for tapping input payload signal at the input of the
Intensity Modulator;
an optical to electrical converter for converting the tapped input
payload signal into input electrical signal; and
means for processing said input electrical signal.

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11. A system as claimed in claim 9, wherein the means for extracting
and processing signals at the output of the Intensity Modulator,
comprises:

an output optical tap for tapping output payload signal at the output of the Intensity Modulator;

an optical to electrical converter for converting the tapped output payload signal into output electrical signal; and

5 means for processing said output electrical signal.

12. A system as claimed in claim 9, wherein the DSPCU comprises:

an Amplitude and Phase Estimator for estimating a frequency band in the payload to be cancelled;

10 an Adaptive Variable Gain Control Unit for generating a variable gain control signal as a first output signal of the DSPCU; and

an Adaptive Phase Delay Control Unit for generating a phase delay control signal as a second output of the DSPCU.

15 13. A system as claimed in claim 12, wherein the Amplitude and Phase Estimator comprises:

means for extracting the amplitudes and phases of the spectral components of the frequency band in the payload to be cancelled using a DFT (Digital Fourier Transform) of the processed output electrical signal; and

20 means for computing an effective amplitude and phase for each spectral component of the frequency band in the payload to be cancelled.

14. A system as claimed in claim 10, wherein the means for processing the input electrical signal comprises:

an amplifier for amplifying the input electrical signal in accordance with the first output signal produced by the DSPCU; and a high order linear band-pass filter for filtering the frequency band in the payload to be cancelled.

15. A system as claimed in claim 9, wherein the means for generating the cancellation signal comprises:

a Variable Phase Delay unit for phase matching the input payload signal at the Intensity Modulator and the cancellation signal applied to the Intensity Modulator, using the second output signal produced by the DSPCU and the extracted and processed input signal; and a driver for applying the cancellation signal to the Intensity Modulator for selectively controlling the intensity of the payload and removing the frequency band to be canceled in the payload.

16. A system as claimed in claim 11, wherein the means for processing the output electrical signal comprises:

an amplifier for amplifying the output electrical signal in accordance with a third output signal produced by the DSPCU;

a high order linear band-pass filter for extracting the frequency band in the payload to be cancelled; and

an Analog to Digital Converter (ADC) for converting the analog signal at the output of said high order linear band-pass filter to digital for the digital processing performed by the DSPCU.

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